

What do millimeter continuum and spectral line observations tell us about solar system bodies?

Stefanie N. Milam

NASA Goddard Space Flight Center, Astrochemistry Laboratory Code 691, Greenbelt, MD 20771, USA; stefanie.n.milam@nasa.gov

Solar system objects are generally cold and radiate at low frequencies and tend to have strong molecular rotational transitions. Millimeter continuum and spectral line observations provide detailed information for nearly all solar system bodies. At these wavelengths, details of the bulk physical composition of icy surfaces, the size and albedo of small objects, the composition of planetary atmospheres can be measured as well as monitoring of time variable phenomena for extended periods (not restricted to nighttime observations), etc. Major issues in solar system science can be addressed by observations in the millimeter/sub-millimeter regime such as the origin of the solar system (isotope ratios, composition) and the evolution of solar system objects (dynamics, atmospheric constituents, etc). ALMA's exceptional sensitivity, large spectral bandwidth, high spectral resolution, and angular resolution (down to 10 milliarcsec) will enable researchers for the first time to better resolve the smallest bodies in the solar system and provide detailed maps of the larger objects. Additionally, measurements with nearly 8 GHz of instantaneous bandwidth to fully characterize solar system object's spectrum and detect trace species. The spatial information and line profiles can be obtained over 800 GHz of bandwidth in 8 receiver bands to not only assist in the identification of spectral lines and emission components for a given species but also to help elucidate the chemistry of the extraterrestrial bodies closest to us.